

REMARKS

Claims 1-9 and 11 are all the claims pending in the application. Claims 1-5 are withdrawn from consideration.

Claim Rejections

In the Office Action, claims 6-9 and 11 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kelley et al (US 6,433,359) in view of Sirringhaus et al (US 6,905,906).

Response

Applicant respectfully traverses the rejection and submits that the cited references, whether taken alone or in combination, do not teach or suggest the presently claimed invention.

As previously pointed out, one feature of the present invention is that the insulating material of the metal oxide material is irradiated with ultraviolet rays in an ozone atmosphere thereby to remove contaminants from the surface and to uniformly produce hydroxyl groups on the surface. Independent claims 6 and 8 recite that the hydroxyl groups are uniformly produced on the surface of the gate insulating layer so as more clearly define the invention.

As acknowledged by the Examiner, Kelley et al fails to disclose a gate insulating layer having a large number of hydroxyl groups. To remedy this deficiency the Examiner relies on Sirringhaus et al as teaching a surface of a gate insulating layer (PVP) having a large number of hydroxyl groups uniformly.

The PVP of Sirringhaus et al is a polymer having a large number of hydroxyl groups. However, Sirringhaus et al fails to disclose that the hydroxyl groups are uniformly produced on the surface as in the present invention. Thus, Sirringhaus et al does not make up for the deficiencies of Kelley et al, and one of ordinary skill in the art would not have had a reasonable expectation of success in achieving the claimed invention based on the teachings of Kelley et al and Sirringhaus et al.

Independent claims 6 and 8 also recite that the gate insulating layer is irradiated with ultraviolet rays in an ozone atmosphere before forming the surface-treated layer. This is significant because when a polymer having a large number of hydroxyl group is used as the gate insulating layer, as in Sirringhaus, the surface is contaminated. Thus, one of ordinary skill in the art would consider that the hydroxyl groups do not actually react with the surface treatment agent used to form the surface-treated layer uniformly or that only part of the hydroxyl groups react with the surface treatment agent used to form the surface-treated layer.

According to the present invention, by performing the UV/O₃ process before forming the surface-treated layer, the contaminant on the insulating layer is removed. Therefore, it becomes possible to uniformly produce hydroxyl groups on the surface of the gate insulating layer. Thus, a gate insulating layer having a uniform surface energy can be formed and an organic transistor having low variations and high mobility can be produced.

With regard to the Office Action's position regarding the "product by process" claims 6, 8, and 11, namely that the limitations in those claims do not further define the claimed structure, Applicant respectfully disagrees. The Declaration submitted herewith further illustrates that the product produced by the process as recited in the claims has unexpectedly superior properties. The Declaration does this by comparing Example 2 to the Comparative Example in the specification. Specifically, the organic transistor of the Comparative Example was produced in the same manner as the organic transistor of Example 2 except that no UV radiation step was performed. As can be seen from the difference between Example 2 and the Comparative Example, shown in Table 1 of the Declaration (and in Table 1 on page 12 of the present application), the mobility of the organic transistor produced in accordance with the present invention is more than twice as high when the UV irradiation process is performed. Thus, the present invention provides unexpectedly superior results over the prior art.

In view of the above, the present invention is not rendered obvious by the cited references.

Accordingly, Applicant respectfully requests withdrawal of the rejection.

RESPONSE UNDER 37 C.F.R. § 1.111
Application No. 10/829,179

Attorney Docket No.: Q81224

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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